What is claimed is:

1. A method for transmitting a signal from a plurality of antennas, said method comprising the steps of:

receiving a symbol stream at a transmitter;

performing a transform on said input symbol stream to generate a transform result, said transform result comprising an NXN' orthogonal space-time block code, and generating N' first signals;

non-zero complex weighting, over time, at least one of the N' first signals of said transform result to generate at least one second signal, each of said at least one second signals being phase shifted relative to the one of the N' first signals from which it was generated; and,

transmitting, substantially simultaneously, each of said N' first signals of said transform result on one of a first at least one antenna and, each of said at least one second signals on one of a second at least one antenna.

2. The method of claim 1, wherein said input symbol stream comprises the symbols S1, S2 and said space time block code comprises a 2x 2 space time block code, and said N' signals comprises the stream of (S1, S2) transmitted at t1 and t2, respectively, and (-S2*, S1*) transmitted at t1 and t2, respectively.

3. The method of claim 1, wherein said input symbol stream comprises the symbols S1, S2, and said space time block comprises a 2 x 2 space time block code, and said N' signals comprises the streams of (S1, -S2*) transmitted at t1 and t2, respectively, and (S2, S1*) transmitted at t1 and t2, respectively.

4. The method of claim 1, wherein said first at least one antenna and said second at least one antenna comprises a first plurality of N' antennas and a second plurality of N' antennas, respectively, said input symbol stream

comprises a traffic channel symbol stream and wherein said method further comprises the step of:

transmitting each of 2N' common pilot channel signals on a separate one of said first plurality of N' antennas or on a separate one of said second plurality of N' antennas.

5. The method of claim 1, wherein said input symbol stream comprises a traffic channel stream and said method further comprises the step of:

receiving N' common pilot channel signals at said transmitter;

non-zero complex weighting, over time, each of said N' common pilot channel signals to generate N' non-zero complex weighted common pilot channel signals;

transmitting, substantially simultaneously, each of said N' common pilot channel signals on one of said first at least one antenna, and each of said N' non-zero complex weighted common pilot channel signals on one of said second at least one antenna.

6. The method of claim 1, wherein said input symbol stream includes a traffic channel stream, and wherein said method further comprises the step of:

inserting each of N' pilot signals after one of said N' first signals of said transform result to generate N' first signals including inserted pilot signal;

wherein said step of non-zero complex weighting comprises non-zero complex weighting, over time, each of said N' first signals including inserted pilot signal to generate N' second signals including inserted pilot signal; and,

wherein said step of transmitting comprises transmitting, substantially simultaneously, each of said N' first signals including inserted pilot signal on one of a first at least one antenna, and

each of said N' second signals including inserted pilot signal on one of a second at least one antenna.

7. The method of claim 1, wherein said step of non-zero complex weighting comprises phase shifting at least one of said N' first signals using a continuous analog phase sweep.

8. The method of claim 1, wherein said step of non-zero complex weighting comprises phase shifting at least one of said N' first signals a predetermined hopping sequence.

9. The method of claim 8 wherein hopping weights for said predetermined hopping sequence are derived from a PSK constellation having Z states and wherein all states are sampled with the same frequency within a transmission frame.

10. The method of claim 8 wherein hopping weights for said predetermined hopping sequence are derived from a PSK constellation having Z states.

11. The method of claim 1, wherein said space time block code comprises a 2 x 2 STS block code and said N' first signals comprise the streams of (S1W1 – S2*W2) transmitted at t1 and (S2W1 + S1*W2) transmitted at t1, wherein W1 and W2 are each a serial concatenation of at least two Walsh codes.

12. The method of claim 1, wherein said space time block code comprises a 2 x 2 STS block code and said N' first signals comprise the streams of (S1W1 + S2W2) ) transmitted at t1 and (–S2*W1 + S1*W2) ) transmitted at t1, wherein W1 and W2 are each a serial concatenation of at least two Walsh codes.

13. An apparatus for transmitting a signal, said transmitter comprising:

an input symbol stream;

a processor for performing a transform on said input symbol stream to generate a transform result, said transform result comprising an N' x N' orthogonal space-time block code, and generating N' first signals;

at least one weighter for, non-zero complex weighting, over time, at least one of the N' first signals of said transform result to generate at least one second signal, each of said at least one second weighted signals phase shifted relative to the one of the N' first signals from which it was generated, and;

a transmitter for transmitting, substantially simultaneously, each of said N' first signals of said transform result on one of a first at least one antenna, and each of said N' second signals on one of a second at least one antenna.

14. The apparatus of claim 13, wherein said input symbol stream comprises the symbols S1, S2 and said space time block code comprises a 2x 2 space time block code, and said N' first signals comprise the stream of (S1, S2) transmitted at t1 and t2, respectively, and (-S2*, S1*) transmitted at t1 and t2, respectively.

15. The apparatus of claim 13, wherein said input symbol stream comprises the symbols S1, S2 and said space time block comprises a 2x 2 space time block code and said N' first signals comprise the streams of (S1, -S2*) transmitted at t1 and t2, respectively, and (S2, S1*) transmitted at t1 and t2, respectively.

16. The method of claim 13, wherein said first at least one antenna and said second at least one antenna comprise a first plurality of N' antennas and a second plurality of N' antennas, respectively, said input symbol stream comprises a traffic channel symbol stream and wherein said transmitter further comprises;

at least one input for receiving N' common pilot channel signals at said transmitter;

a weighter, said non-zero complex weighter for non-zero complex weighting, over time, each of said N' common pilot channel signals to generate N' non-zero complex weighted common pilot channel signals; and,

wherein said transmitter further transmits each of said N' common pilot channel signals on a separate one of said first at least one antenna and each of said N' non-zero complex weighted common pilot channel signals on a separate one of said second at least one antenna.

17. The apparatus of claim 13, wherein said input symbol stream includes a traffic channel stream and wherein said apparatus further comprises;

a multiplexer for inserting each of N' pilot signals after one of said N' first signals of said transform result to generate N' first signals including inserted pilot signal; and,

at least one weighter for non-zero complex weighting, over time, each of said N' signals including inserted pilot signal to generate N' second signals including inserted pilot signal; and,

wherein said transmitter transmits, substantially simultaneously, each of said N' first signals including inserted pilot signal on one of a first at least one antenna, and each of said N' second signals including inserted pilot signal on one of a second at least one antenna.

18. The apparatus of claim 13, wherein said at least one weighter phase shifts at least one of said N' first signals using a continuous analog phase sweep.

19. The apparatus of claim 13, wherein said at least one weighter phase shifts at least one of said N' first signals using a predetermined hopping sequence.

20. The apparatus of claim 19, wherein hopping weights for said predetermined hopping sequence are derived from a PSK constellation by randomly permuting from the Z possible states for successive slots of the transmission frame.

21. The apparatus of claim 13, wherein said space time block code comprises a 2 x 2 STS block code and said N' first signals comprise the streams of (S1W1 – S2*W2) transmitted at t1 and (S2W1 + S1*W2) transmitted at t1, wherein W1 and W2 are each a serial concatenation of at least two Walsh codes.

22. The apparatus of claim 13, wherein said space time block code comprises a 2 x 2 STS block code and said N' first signals comprise the streams of (S1W1 + S2W2) ) transmitted at t1 and (–S2*W1 + S1*W2) ) transmitted at t1, and wherein W1 and W2 are each a serial concatenation of at least two Walsh codes.